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factory. On the basis of such omissions, a general distrust is thrown about the whole work, which only a very careful and accurate refutation by the authors of the work can remove.

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#### BOOK-REVIEWS.

*The Origin of Mountain Ranges, considered Experimentally, Structurally, Dynamically, and in Relation to their Geological History.* By T. MELLARD READE. London, Taylor & Francis. 8°.

MOUNTAIN ranges, that show the effects of lateral compression in their folded structure, are explained by most geologists by means of Elie de Beaumont's 'contractional hypothesis': the interior of the earth is thought to be contracting as it cools, and the outer part, or 'crust,' wrinkles as it settles down to accommodate itself to the diminished interior. But in recent years several geologists have urged that this hypothesis was quantitatively insufficient to account for the known mountain ranges, and while these criticisms do not seem to me to be by any means fatal to the effective working of the contractional process to a considerable extent, they have served a good purpose in emphasizing the need of further search for methods of mountain-making. The want of any sufficient means of accounting for plateaus of massive elevation, also points to the importance of further study of the physics of the earth.

The illustrious Playfair, writing early in this century, thought nothing so capable of causing a slow-acting, irresistible elevatory force as the expansive power of heat; but he suggested no means of applying the heat in proper time, place, and quantity. Mr. Mellard Reade, following out an idea advanced by Capt. Thos. Hutton of New Zealand, and others, attempts to supply this deficiency as follows: mountain regions were once regions of heavy sedimentation; the slow accumulation of sediments caused a depression, and a consequent warming of the mass beneath them; the warming mass tends to expand in all directions, but can expand only vertically; and, in this conversion of cubic into linear expansion, Mr. Reade finds a 'sufficient cause for the extravasation of lavas, the elevation of plateaus, and the crushing deformation of mountain ranges.' The last-named process seems to me only remotely connected with this cause, but the other two may find some or much explanation in it. It is necessary, in order that the process shall work efficiently, that the depression caused by sedimentation, shall for a time go on faster than the consequent ascent of the deep isogeotherms; if we admit this to be possible, the hypothesis gives a qualitatively correct explanation of those paradoxical changes of level seen in the elevation of areas heavily loaded with sediments, and the depression of lands deeply denuded; it also suggests a reasonable correlation between the slow, light sedimentation of such regions as Wisconsin, and their long exemption from serious disturbance. The process therefore deserves to be discussed rather than dismissed: working with other processes, it will, I believe, come to be accepted as a useful aid to a common end.

W. M. D.

*The Teaching of Geography.* By ARCHIBALD GEIKIE. London, Macmillan. 12°.

THE book under review is the first volume of Macmillan's geographical series, which is edited by Archibald Geikie. It is an introduction on the teaching of geography, in which the author sets forth his views on the scope and goal of geographical science and of the methods of teaching it. The book shows in an admirable way how geography can be made a useful and attractive study, how in teaching it the mental faculties of the child can be developed and its power of observation increased.

Of course, the author's method rests on the views he holds on the aims and method of geography. He says (p. 2), "It is the special function of geography to direct our attention to the [phenomena surrounding us], to increase our knowledge of the country we live in, and thence to trace analogies and contrasts among the aspects of nature in other regions of the globe. Geography compares the topography of one continent with that of another, dwelling upon the fundamental elements of each, and showing how they have affected the distribution and development of the human population. . . . In gathering the materials for this comprehensive picture of the

earth as the dwelling-place of man, geography culs freely from almost every branch of natural science and from history."

From this standpoint the subject is admirably treated. Geikie shows how every single fact and every single observation can be made use of from a geographical standpoint,—the state of the weather, the furniture of the school-room, the silk kerchief of a child, or the coal used for fuel. He makes the study of the surroundings the starting-point for teaching phenomena of natural history, of meteorology, history, and of social science. But it seems to us that if the curriculum of a school should be planned out according to Geikie's suggestions, the geographical point of view would become too predominant. His recommendation that actual observations should always be the foundation of teaching is of eminent importance, but observations must not be exclusively treated from a geographical standpoint.

Two ends are to be kept in view in teaching: the development of the power of reasoning and of observation, and that of the heart and feelings. In the elementary stage both goals are attained by inducing the child to look at the things themselves, and to take a lively interest in them, and by training it to notice differences in things. By this method the child gains an active interest in the subject which it is taught, and a foundation is laid for future explanations and classifications. So far, Geikie's proposals cannot be excelled. But later on, the character of the natural sciences and physics makes it necessary that they deal to a great extent with generalizations and abstractions which only educate the powers of reasoning. Geography acts as an important counterbalance against this tendency, and we should wish that this fact had been more energetically emphasized by the author. He recognizes this fact, and mentions it in several passages of the book, e.g., "The objects of excursions are to train the pupils in habits of observation and reflection, to teach them the elements of topography, to enlarge their capacity for the comprehension of geography, and generally to stimulate their love of nature" (p. 73). But it is our opinion that this last point ought to be made the principal goal of geography-teaching in all grades. While the teacher of natural science chiefly develops the power of reasoning, the geographer must always try to keep alive the actual interest in the individual phenomenon as it presents itself to the eye, and in the mutual interdependence of its parts. Therefore geography must be placed in the curriculum of the school in one class with history and literature, and in advanced teaching it ought to be treated accordingly.

If Geikie's proposals for elementary teaching were accepted by teachers,—not of geography alone,—and if the historical standpoint were to be taught in the same enlightened way, a great step forward would be made.

We agree more fully with the author's views on the teaching of physical geography than with his treatment of political geography. Many subjects upon which he touches, which belong to linguistics and social science, seem to be too difficult to be grasped by a child, and others can be more adequately dealt with from an historical point of view than from a geographical one. The cultivation of land, its products, the situation of villages and roads, and similar subjects, may be treated with advantage, while money, telegraph, and post, etc., are more satisfactorily dealt with from an historical standpoint. Particular care ought to be taken in treating anthropogeographical subjects, for most of these phenomena are so complicated that the juvenile mind is unable to grasp them. Science itself has not treated these subjects in a satisfactory way, and most of its theories are vague and not well founded. We should hesitate, for instance, to lay any stress on such facts as the position of Britain in the very midst of the land hemisphere (p. 198), as upon thorough investigation it may be shown that in fact they are only of secondary importance. But the elementary problems of anthropogeography may be treated: the influence of climate upon the life of peoples and man, the means of communication, and their dependence upon the configuration of the ground, etc.

The present book, and several other publications, are proof of the stimulus the teaching of geography has received in England by the endeavors of the Royal Geographical Society. So far, little interest has been awakened on this side of the ocean, but publications of this kind cannot fail to excite the interest of American geographers.

F. BOAS.